

# *The African Organisation for Standardisation*

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ARS 874 (2012) (English): Lima beans --  
Specification



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**Lima beans — Specification**



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## Introduction

*Phaseolus lunatus*, commonly called lima beans or butter beans, are popular legumes that are known for their meaty texture and mild buttery flavour. They are widely used in countries in Central America; Latin America Asia, Caribbean and Africa. These highly nutritious beans provide protection against a number of diseases and ailments and are particularly beneficial for the cardio-vascular system and the digestive system.

Draft African Standard for comments only — Not to be cited as African Standard





## Lima beans — Specification

### 1 Scope

This African Standard specifies the requirements and methods of sampling and test for lima beans of cultivated varieties (cultivars) grown from *Phaseolus lunatus* Linn intended for human consumption.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ARS 53, *General principles of food hygiene — Code of practice*

ARS 56, *Prepackaged foods — Labelling*

AOAC Official Method 2001.04, *Determination of Fumonisin B<sub>1</sub> and B<sub>2</sub> in corn and corn flakes — Liquid chromatography with immunoaffinity column cleanup*

CODEX STAN 193, *Codex general standard for contaminants and toxins in food and feed*

ISO 520, *Cereals and pulses — Determination of the mass of 1000 grains*

ISO 605, *Pulses — Determination of impurities, size, foreign odours, insects, and species and variety — Test methods*

ISO 2164, *Pulses — Determination of glycosidic hydrocyanic acid*

ISO 2171, *Cereals, pulses and by-products — Determination of ash yield by incineration*

ISO 4112, *Cereals and pulses — Guidance on measurement of the temperature of grain stored in bulk*

ISO 4174, *Cereals, oilseeds and pulses — Measurement of unit pressure loss in one-dimensional air flow through bulk grain*

ISO 5223, *Test sieves for cereals*

ISO 5527, *Cereals — Vocabulary*

ISO 6322-1, *Storage of cereals and pulses — Part 1: General recommendations for the keeping of cereals*

ISO 6322-2, *Storage of cereals and pulses — Part 2: Practical recommendations*

ISO 6322-3, *Storage of cereals and pulses — Part 3: Control of attack by pests*

ISO 6639-1, *Cereals and pulses — Determination of hidden insect infestation — Part 1: General principles*

ISO 6639-2, *Cereals and pulses — Determination of hidden insect infestation — Part 2: Sampling*

ISO 6639-3, *Cereals and pulses — Determination of hidden insect infestation — Part 3: Reference method*

ISO 6639-4, *Cereals and pulses — Determination of hidden insect infestation — Part 4: Rapid methods*

ISO 6888-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 1: Technique using Baird-Parker agar medium*

ISO 6888-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 2: Technique using rabbit plasma fibrinogen agar medium*

ISO 6888-3, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 3: Detection and MPN technique for low numbers*

ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*

ISO 13690, *Cereals, pulses and milled products — Sampling of static batches*

ISO 16002, *Stored cereal grains and pulses — Guidance on the detection of infestation by live invertebrates by trapping*

ISO 16050, *Foodstuffs — Determination of aflatoxin B<sub>1</sub>, and the total content of aflatoxin B<sub>1</sub>, B<sub>2</sub>, G<sub>1</sub> and G<sub>2</sub> in cereals, nuts and derived products — High performance liquid chromatographic method*

ISO/TS 16634-2, *Food products — Determination of the total nitrogen content by combustion according to the Dumas principle and calculation of the crude protein content — Part 2: Cereals, pulses and milled cereal products*

ISO 20483, *Cereals and pulses — Determination of the nitrogen content and calculation of the crude protein content — Kjeldahl method*

ISO 21527-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 2: Colony count technique in products with water activity less than or equal to 0.95*

ISO 24557, *Pulses — Determination of moisture content — Air-oven method*

## 3 Definitions

For the purpose of this standard the following definitions apply.

### 3.1

#### **lima beans**

dried mature seeds of *Phaseolus lunatus* Linn

### 3.2

#### **broken**

pieces of lima beans that are less than three-quarters the size of a whole seed

### 3.3

#### **foreign matter**

any extraneous matter than lima beans or other food grains comprising of

- (a) "inorganic matter" includes metallic pieces, shale, glass, dust, sand, gravel, stones, dirt, pebbles, lumps or earth, clay, mud and animal filth etc;
- (b) "organic matter" consisting of detached seed coats, straws, weeds and other inedible grains etc.

**3.4****heated-damaged kernels**

lima beans are considered heated or rotted if they are materially discoloured as a result of heating or rotting. Seed coats appear dark brown to black. The cotyledon tissue of dissected beans appears tan or brown.

**3.5****poisonous, toxic and/or harmful seeds**

any seed which if present in quantities above permissible limit may have damaging or dangerous effect on health, organoleptic properties or technological performance such as Jimson weed — *Datura* (*D. fastuosa* Linn and *D. stramonium* Linn.) corn cokle (*Agrostemma githago* L., *Machai Lallium remulenum* Linn.) Akra (*Vicia* species), *Argemone mexicana*, Khesari and other seeds that are commonly recognized as harmful to health

**3.6****splits**

pieces of lima beans that are not damaged, each of which consists of three-fourths or less of the whole lima beans and shall include any sound lima beans the halves of which are held together loosely

**3.7****total defective**

% max by wt lima beans not of the specified variety and lima beans remaining above the 6mm slot screen that are bin burnt, broken, caked, chipped, damaged, frost damaged, heat damaged, insect damaged, sappy, shrivelled, split, sprouted, weather damaged, wrinkled and/or affected by mould (field or storage). Includes whole pods containing seed, mechanical damage, kernel damage, poor colour, *Ascochyta* affected and screenings.

**3.8****mechanical damage**

in reference to *lima beans* means any cracking, splitting or removal of any part of the seed coat or kernel

**3.9****damaged beans**

- whole, split, or broken beans that are sprouted, very immature, perforated, distinctly deteriorated or discoloured by weather or disease.
- beans that are otherwise damaged in a way that seriously affects appearance or quality. This includes mudball beans in processed beans. Other causes of damage include the following:

**3.9.1****germinated beans**

beans which have sprouted

**3.9.2****mouldy beans**

beans with visible mycelial growth on their surface

**3.9.3****shrivelled beans**

beans which are under-developed and wrinkled over their entire surface excluding wrinkled peas

**3.9.4****heat damaged**

beans which have been materially damaged by spontaneous or external heat or as a result of heat caused by fermentation

**3.9.5****cracked seed coats**

cracked seed coats include

- pulses with any cracked seed coats
- pulses with a piece of seed coat missing
- pulses with a seed coat punctured by insect or other means

### 3.10

#### unmillable material

soil, metal and non-vegetable matter

## 4 Quality requirements

### 4.1 General requirements

Lima beans shall meet the following general requirements/limits as determined using the relevant standards listed in Clause 2. Lima beans:

- a) shall consist of mature dry seeds of *Phaseolus lunatus* Linn;
- b) shall be clean, well-filled, wholesome, uniform in size, shape, of good colour characteristic of the variety and in sound merchantable conditions;
- c) shall be free from substances which render them unfit for human or animal consumption or processing into or utilisation thereof as food or feed;
- d) shall be free from abnormal flavours, musty, sour or other undesirable odour, obnoxious smell and discolouration;
- e) shall be free of pests, live animals, animal carcasses, animal droppings, fungus infestation, added colouring matter, moulds, impurities of plant and animal origin including insects, rodent hair and excreta and shall meet any other sanitary and phytosanitary requirements;
- f) shall be free from micro-organisms and substances originating from micro-organisms, fungi or other poisonous or deleterious substances in amounts that may constitute a hazard to human health.
- g) shall be free from toxic or noxious seeds that are commonly recognized as harmful to health;
- h) shall contain no chemical residues which exceed the prescribed maximum residue limit;
- i) shall contain not more than 10 microgram per kilogram aflatoxin of which not more than 5 microgram per kilogram may be aflatoxin B1.

### 4.2 Specific requirements

#### 4.2.1 Grading

Lima beans shall be graded into three grades on the basis of the tolerable limits established in Table 1 which shall be additional to the general requirements set out in this standard.

#### 4.2.2 Ungraded lima beans

Ungraded lima beans shall be lima beans which do not fall within the requirements of Grades 1, 2 and 3 of this standard but meet the minimum requirements provided in 4.1 and are not rejected lima beans. Ungraded lima beans can be sorted out to Grade 1, 2 or 3 in accordance with the relevant procedures.

#### 4.2.3 Reject grade lima beans

Reject lima beans shall be beans which are musty, sour, heating, materially weathered, or weevily; which have any commercially objectionable odour; which contain insect webbing or filth, animal filth, any unknown foreign substance, broken glass, or metal fragments; or which are otherwise of distinctly low quality. The characteristics are not within the parameters specified in Table 1. They cannot satisfy the conditions of under grade lima beans and shall be graded as reject lima beans and shall be regarded as unfit for human or animal consumption.

Table 1 — Specific requirements

Characteristics		Maximum limits			Method of test
		Grade 1	Grade 2	Grade 3	
Varietal purity, % min by wt		99.5	97.0	97.0	ISO 605
Contrasting classes <sup>1)</sup> , % m/m, max.		0.5	1.0	2.0	
Classes that blend <sup>2)</sup> , % m/m, max.		5.0	10.0	15.0	
Total foreign matter, % m/m		0.5	1.0	2.0	
Inorganic matter, % m/m		0.1	0.3	0.5	
Broken grains, % m/m		3.0	5.0	5.0	
Splits, % m/m		3.0	5.0	5.0	
Pest damaged grains, % m/m		0.3	0.8	1.5	
Rotten and diseased grains, % m/m		0.2	0.5	0.5	
Discoloured grains, % m/m		1.0	3.0	3.0	
Immature/shrivelled grains, % m/m		2.0	4.0	5.0	
Filt, % m/m		0.1	0.1	0.1	
Total defective grains, % m/m		6.0	7.0	8.0	
Beans through a sieve, % m/m, max.	11.11 mm	3.0	5.0	10.0	ISO 5223
	9.53 mm	1.0	3.0	5.0	ISO 5223
Moisture <sup>3)</sup> , % m/m		14.0	14.0	14.0	ISO 24557
Total Aflatoxin (AFB <sub>1</sub> +AFB <sub>2</sub> +AFG <sub>1</sub> +AFG <sub>2</sub> ), ppb max		10			ISO 16050
Aflatoxin B <sub>1</sub> only, ppb, max		5			
Fumonisin, ppm, max		2			AOAC 2001.04

<sup>1)</sup> Beans with more than 2.0 percent contrasting classes are graded Mixed beans.

<sup>2)</sup> Beans with more than 15.0 percent classes that blend are graded Mixed beans.

<sup>3)</sup> Beans with more than 14.0 percent moisture are graded High moisture.

## 5 Contaminants

### 5.1 Heavy metals

Lima beans shall comply with those maximum limits for heavy metals established by the Codex Alimentarius Commission for this commodity.

### 5.2 Pesticide residues

Lima beans shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity

### 5.3 Mycotoxin limits

Lima beans shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity. In particular, total aflatoxin levels in lima beans for human consumption shall not exceed 10 µg/kg (ppb) with B<sub>1</sub> not exceeding 5 µg/kg (ppb) when tested according to ISO 16050.

## **6 Hygiene**

**6.1** Lima beans shall be produced, prepared and handled in accordance with the provisions of appropriate sections of ARS 53.

**6.2** When tested by appropriate standards of sampling and examination listed in Clause 2, the products:

- shall be free from microorganisms in amounts which may represent a hazard to health and shall not exceed the limits stipulated in Table 2;
- shall be free from parasites which may represent a hazard to health; and
- shall not contain any substance originating from microorganisms in amounts which may represent a hazard to health.

**Table 2 — Microbiological limits**

	Type of micro-organism	Limits	Test method
i)	Yeasts and moulds, max. per g	10 <sup>5</sup>	ISO 21527-2
ii)	<i>Staphylococcus aureus</i> per 25 g	Not detectable	ISO 6888
iii)	<i>E. Coli</i> , max. per g	Not detectable	ISO 7251
iv)	<i>Salmonella</i> , max. per 25 g	Not detectable	ISO 6579

## **7 Packaging**

**7.1** Lima beans shall be packed in suitable packages which shall be clean, sound, free from insect, fungal infestation and the packing material shall be of food grade quality.

**7.2** Lima beans shall be packed in containers which will safeguard the hygienic, nutritional, technological and organoleptic qualities of the products.

**7.3** The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They shall not impart any toxic substance or undesirable odour or flavour to the product.

**7.4** Each package shall contain lima beans of the same type and of the same grade designation.

**7.5** If lima beans are presented in bags, the bags shall also be free of pests and contaminants.

**7.6** Each package shall be securely closed and sealed.

## **8 Labelling**

**8.1** In addition to the requirements in ARS 56, each package shall be legibly and indelibly marked with the following:

- i) product name as “Lima Beans”;
- ii) grade;
- iii) name, address and physical location of the producer/ packer/importer;
- iv) lot/batch/code number;
- v) net weight, in kg;



- vi) the declaration “Food for Human Consumption”
- vii) storage instruction as “Store in a cool dry place away from any contaminants”;
- vii) crop year;
- ix) packing date;
- x) instructions on disposal of used package;
- xi) country of origin;
- xii) a declaration on whether the lima beans were genetically modified or not.

## **8.2 Labelling of non-retail containers**

Information for non-retail containers shall either be given on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

## **9 Sampling methods**

Sampling shall be done in accordance with the ISO 13690.

**Bibliography**

United States Standards for Beans, Effective December 2008: *Grades and grade requirements for the class Large Lima Beans*

Draft African Standard for comments only — Not to be cited as African Standard

Draft African Standard for comments only — Not to be cited as African Standard